Pacific Islands

GIS&RS news

The Newsletter of the GIS/Remote Sensing Users in the Pacific
Issue 3/2003
December 2003

10 Years of GIS&RS Newsletter ....

FIJI USER GROUP

GIS AND REMOTE SENSING NEWS

OCTOBER NEWS

GIS FACILITIES AT USP

Time has flown. We have been producing the GIS&RS newsletter for over ten years. The newsletter started in 1993 where MSD-Forestry (Management Services Division, the forestry inventory section) was assisted by SOPAC in jointly editing and printing the newsletter. See picture of first newsletter.

In the early nineties, MSD-Forestry was the only entity in Fiji and other Pacific Island Countries analysing digital satellite images and together with the Native Land Truth Board the only practical users of GIS. It was essential to have regular monthly meetings to discuss upcoming issues such as different projections, formats and data standards with other organisations who were investigating GIS establishment. This was the start of the GIS and Remote Sensing User Group, which is now an established forum.

In the first years of the newsletter there was a need to document and publish these monthly meetings to ensure that all stakeholders were informed, data sharing promoted and duplication of effort avoided. In addition to reports of the meetings, the newsletter included articles covering new applications in the fields of GIS, RS and GPS and also provided information about availability of new data and new software and hardware products. Over the years the "Fiji User Group GIS and RS News" evolved into the "Pacific Islands GIS&RS News". The Fiji User Group monthly meeting reports were discontinued in the newsletter and were published via the GIS-PACNet mailing list.

The newsletter still does not need any advertisements to cover the printing and distribution, which is done by SOPAC as most members of the editorial team work on the newsletter in their free time. The newsletter is distributed in nearly all Pacific Island Countries with articles contributed from many of the countries. However, this is still a shortage of articles and considerable time is spent communicating with potential contributors and demonstrating the value of documenting their activities and outcomes.

The editorial team changed several times over the years. Wolf Forstreuter is still looking after the newsletter since day one when it started with him and Les Allinson. Lala Bukarau, who joined at a very early stage to ensure a more professional editing, is still part of the team. To involve another regional organisation, training GIS and Remote Sensing, the University of the South Pacific became part of the editorial team. First James Britton gave the newsletter a new outlook and today, Conway Pene is contributing his ideas. We look forward to an increase in contribution to enable more newsletters being published per year.

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Content

First Images of OrbView-3

pan-sharpened image of Bagdad available on OrbImage's web site

GIS Customisation Training

Ben Parakoti
Department of Water Works
Cook Islands

The Department of Water Works, Rarotonga GIS Customisation workshop commenced on the 19th of November and ended on the 19th of December.

The Department of Water Works has in place a GIS system to manage its data of the water reticulation system on Rarotonga. The data are stored in AutoCAD, MapInfo, Access and Excel. The workshop is designed to expand the storage and management of data.

Discussions were held during the workshop to get the best possible system for the department. This began with the physical pipe as being the smallest information unit.

The pipes installed were at 5.7m lengths of unplasticised Polyvinyl Chloride (uPVC) and 6.0m lengths of Heavy Duty Galvanised Iron (HDGI). Using the join from pipe to pipe would create too many elements and with the increasing number of joins, makes it impossible to identify these joins. This also has the disadvantage on the different materials linked to one unit pipe. We came to conclusion that a pipe join is from a valve or a node.

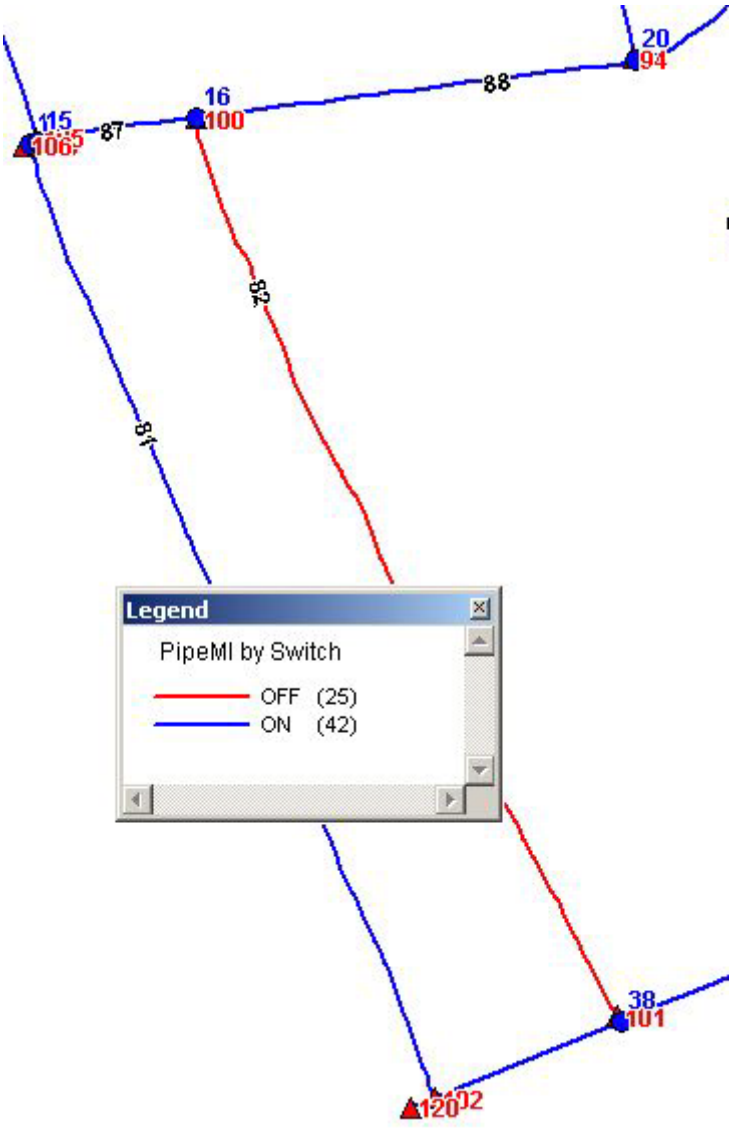
A pipe can be of any quantity of lengths depending on the joins at both ends. A node is at a change point or cross connection point and located on a tee. A valve is a sluice valve, gate valve or a service valve. A hydrant is identified as a valve and in other situations it is considered as an end valve or end point. We also have situations that we have additional nodes between the start valves or between nodes or end valve.

With this situation, the programming part was challenging, as a valve has to be connected to a pipe or a node. The sums of four valves or pipes are connected to a node, especially at cross connection points or feeding points. A node cannot be connected to a node but to a pipe or valve.

A household connection is a tapping band, which is not considered as a node. The pipe from the tapping band to the house is considered as a pipe. Both the tapping band and the pipe to the house is recognised as consumer or customer. All consumers or customers are connected on a pipe and not on a node or valve.

The simulation program WaterFlow was written in MapBasic because it is more stable than Access Basic. The program selects a pipe, which is connected to a valve and sets the switch to "ON". The program also selects the valves connected to pipes, nodes connected to pipes, nodes connected to valves, and identify the start valve, end valve or start node or end node.

Then the program WaterFlow creates a thematic map, where all the pipes that have water flowing through them coloured in blue and all the pipes that do not have water flowing through them coloured in red. This program helps us, for example in the figure below. If there is a break in the line, or if there is a new connection to be installed on the line (pipe 82), valves 100 and 101 must be turned off. From this program we can see which line will be affected and also the customers that will be affected as well.



Developments

GIS databasing is used in development works carried out in the Department of Water Works. The assistance of these software's provides a much efficient and economic system within data collection and storage. This also assists the department in managing its data for past records and future developments.

GIS Applications in the Health Sector

Viliame Vuiyanuca & Salote Vosaicake
(University of the South Pacific)

Introduction

The establishment and application of Geographical Information System within the health sector has been relatively slow in the Pacific. The technology is still being developed providing a chance for small Pacific Island Countries to realise the importance and potential of using spatial datasets in GIS. In Fiji, the amount of data within the Ministry of Health is enormous, and could be better utilised by presenting them visually within the application of a GIS. There is a need to create a pilot project with respect to the applications of GIS in the health sector to demonstrate the importance of this technology to policy makers involved in the decision making process.

This study developed a spatial database of health-related information from the Central Division of Fiji. Though there is a lot of useful and important data within the Department of Health, not much of it is geo-referenced. A GIS interface was created for the available data to provide the end user with a set of tools for: common queries; visualising the spatial distribution of certain public health indicators and; provide the foundation for future development into studies of disease outbreak and distribution patterns.

Objectives:

The aim of the project is not only to display datasets visually but more importantly to explore the potential of GIS in the following areas:

- Mapping the boundaries of nursing zones, medical areas and sub-divisions that fall within the Central Division
- Location of health centers
- Number of medical personnel
- Location of places and population of each nursing zone
- Population density and area in sq km for each nursing zones
- Location of the incidence of dengue hemorrhagic fever in the Suva- Nausori corridor
- Analysis and understanding of spatial epidemiology, in this case dengue fever focusing on the association between the spatial patterns of the dengue epidemic in regards to environmental and cultural factors.

Project Output

Within the Central Division, there are approximately 23 Medical Areas, 71 Nursing Zones, and 46 Health Centres excluding village dispensaries. At the end of the project we managed to produce a complete dataset of the Ministry of Health's Central Division Medical Boundaries which include the medical areas, nursing zones, places (schools, settlements, and villages), population distribution, area of nursing zones in sq km, and the epidemic distribution map showing Dengue

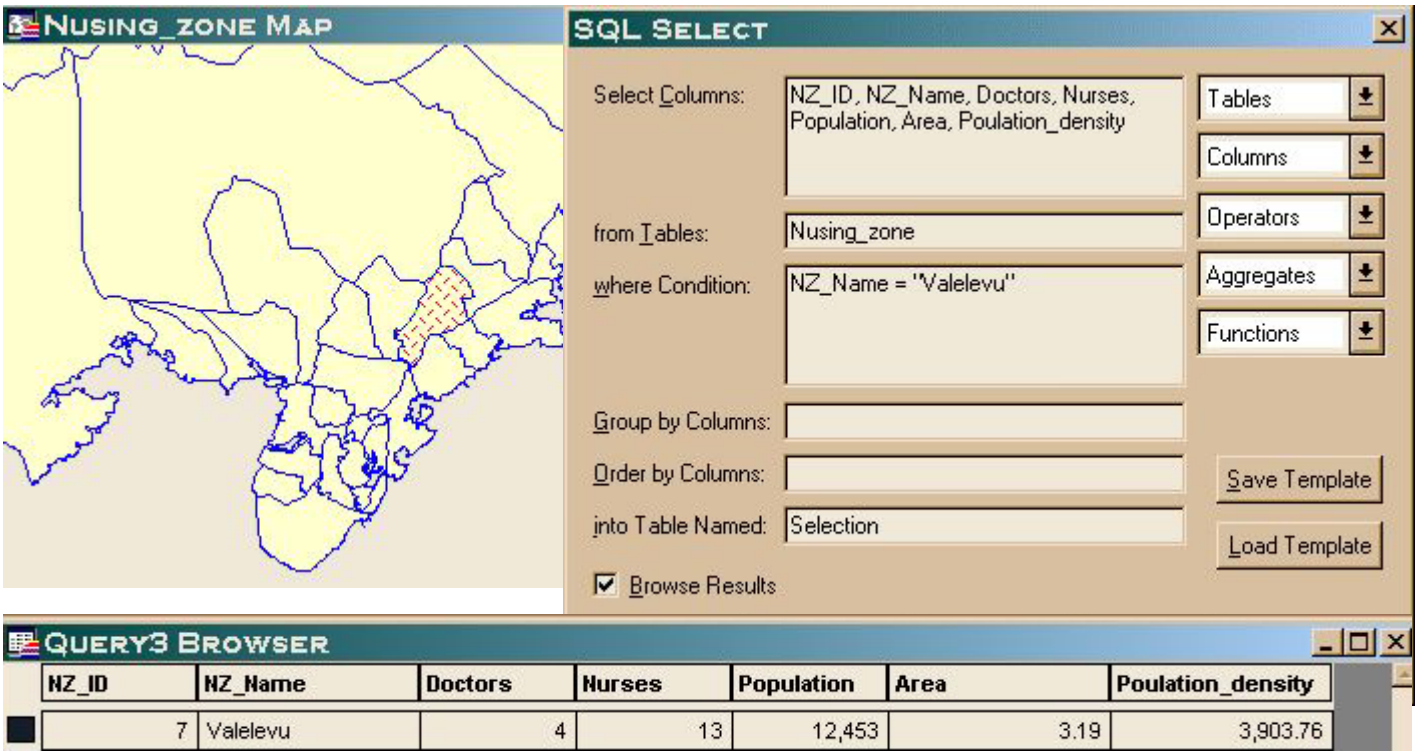


Figure 1: *Using SQL Query to select a Nursing Zone within MapInfo*

(DHF) reported cases at the Colonial War Memorial Hospital (CWMH) between the months of January to April, 2003.

Overview of GIS Analysis on the Incidence of Epidemics

Case Study: Dengue Fever Reported Cases along the Suva-Nausori corridor

Epidemiology is the study of the frequency of occurrence, pattern and distribution of diseases in a population. GIS can be used with significant impact in this field.

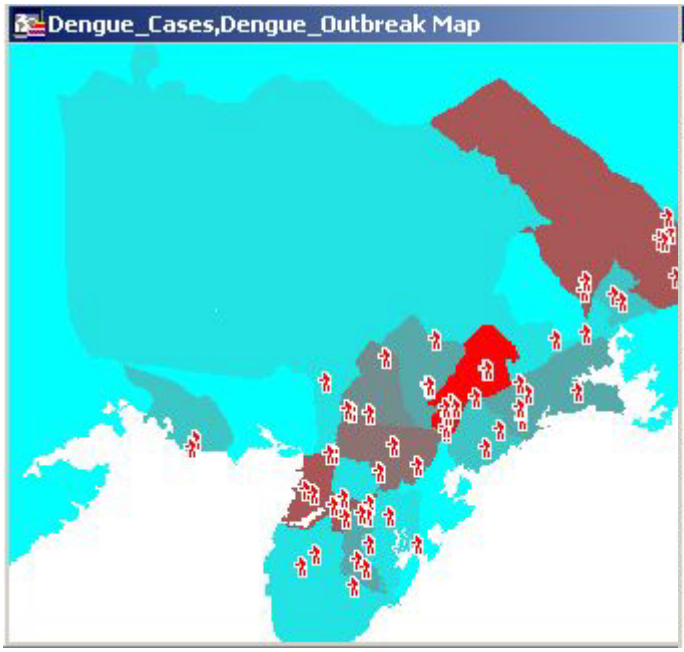
The incidence of communicable diseases in Fiji is high because of its tropical climate. Fiji's geographical features favour the growth and survival of disease-carrying agents called vectors. Medical literature has documented outbreaks of dengue hemorrhagic fever (DHF) in the last few decades with notable fatalities. The interaction between human beings, the host (one that harbours the disease), and the mosquito, *Aedes aegypti*, the vector, is influenced by favourable conditions in the environment and by human activities. Therefore, geography plays a significant role in the transmission of the dengue virus, the infective agent. In addition, being a developing country, socio-economic factors also influence the epidemiology of dengue.

Information collected during dengue outbreaks on the population at risk, environmental conditions that favour its transmission, the pattern and distribution of the population being infected, accessibility and availability of health care can be used to formulate strategies to prevent future outbreaks and to reduce morbidity and mortality. It is in these areas where interactive GIS

Figure 3: *Map Overlay of Medical Areas, Nursing Zones, Places, Health Centers and Roads*

can be beneficial for health planning. To date, PICs including Fiji have not utilised GIS in this area of study.

Last year, Fiji's Ministry of Health launched its Patient Information System (PATIS) where each person in the population is issued a National Health Number (NHN). Each time a person uses the health system, it is recorded in PATIS. The information derived from PATIS will help the Ministry of Health in managing its resources. Linking interactive GIS not only for communicable diseases but for all diseases will assist the Ministry of Health in managing its limited resources effectively and efficiently in the hope of delivering quality health services.



Dengue_Cases Browser

ID	Age	Sex	Address
1	25	Female	Kanavi St
2	29	Female	Kaka Stree
3	19	Male	Belo Stree
4	21	Male	Ono St,Sam
5	5	Female	Hedstrom P
6	14	Female	Verrier Rd
7	13	Female	Mead Rd,Na
8	8	Female	Bayview Ht
9	24	Female	Ragg Ave,
10	25	Male	Kaudamu Rd
11	9	Male	6 Miles_Nasole
12	17	Female	7 Miles_Muanikoso
13	20	Male	Mana St,Narere
14	16	Female	Beaumont R
15	6	Male	Waipimako

Figure 2: *Dengue Fever Reported Cases According to home address*

GIS and Remote Sensing for Fisheries Departments in Pacific Island Countries

Wolf Forstreuter
SOPAC

Introduction

Several remote sensing (RS) techniques and data sources have been developed in recent years to monitor our oceans and identify areas where fish concentration is expected. Continued overfishing of tuna stock in the Atlantic has depleted resources and the concern is the international fishing industry will deplete tuna stocks here in the Pacific too. In attempting to monitor fisheries resources, Pacific Island Countries have to compete against fishing vessels equipped with modern equipment. Each purse seining fishing vessel may invest in equipment worth several million dollars however, not even one of the estimated 50 to 100 boats belongs to a Pacific Island Country. The high running cost between $US 8,000 to 15,000 per day forces a greater perfection in tuna school identification to decrease the number of days spent searching for schools. It is is expected that purse seine fishing vessels are equipped with hardware, software and data to monitor and track resources with the cost easily paid off by reducing time on the ocean by less than a day. The converse is true for fisheries departments in PICs where not one is equipped with remote sensing technology and knowledge to monitor their respective EEZs.

The ocean is the resource of Pacific Island Countries, unexpectedly tuna prices are decreasing with declining stocks. Besides the off shore fisheries, alternative utilisations of the ocean could be assisted by GIS and RS applications.

Figure 1: *A pure seine fishing vessel. These ships require a large investment and have very high running costs. Helicopter and other equipment help to reduce the time these vessels search for tuna.*

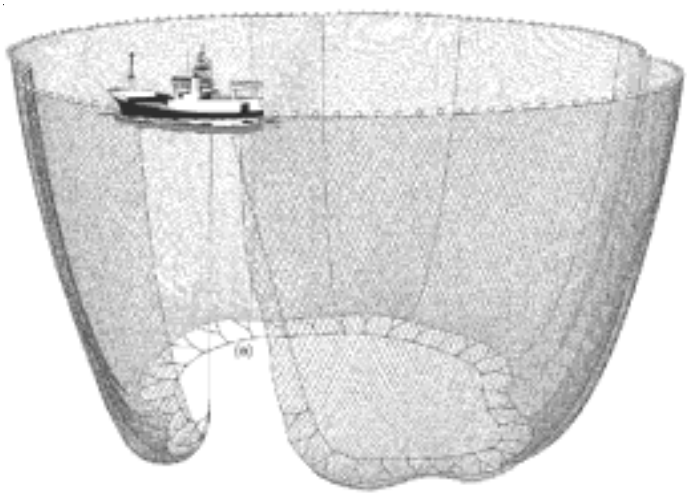


Figure 2: *Pure seine fishing vessel catch a complete school of tuna unlike local near shore fishing vessels which just get the tuna on the surface. This type of fishing decresed the tuna stock in the Pacific and will force the fishery departments to monitor the resource.*

Available Data

Phytoplankton normally is the start of the ocean food chain where tuna will be found soon. Areas of high phytoplankton concentration can be identified through colour analysis of hyper-spectral image data. Hyper-spectral sensors such as SeaWIFS on OrbView-2 satellite or MODIS on Terra satellite or MERIS on ENVISAT record the surface reflection in many but narrow spectral bands, they have for example several bands for the blue part of the spectrum unlike the “normal” land use satellites which have one only band for blue, one for green, etc.

Figure 3: *ENVISAT is a new satellite which helps to monitor the worlds oceans. Equipped with 10 different sensors it will provide new quality of data which adds to the data available from OrbView-2, Terra, NOAA and others.*

Another indicator for tuna catch is the sea surface temperature. Data can be recorded by sensors such as AVHRR on board NOAA satellite, MODIS on board of Terra Satellite and AATSR on board of ENVISAT.

Monitoring the Off Shore Fishery

It is important to monitor the EEZ of each country to guide their own fishing fleets even if there are only long liners or small boats available. There is also another reason: in areas where is a high possibility of tuna foreign fishing vessels are guided by modern technology will be concentrated. However, as mentioned before currently there is no fishing department equipped with necessary software and skilled personnel to carry out sophisticated RS analysis.

SOPAC plans to in conjunction with IRD in Noumea, New Caledonia to send pre-processed image data from IRD to Cook Islands . If this test turns out to be successful other countries will be supplied as well until the facilities are established within the fishery departments of the Pacific Island Countries.

SOPAC plans as a first step to enhance the near shore marine application, where GIS and RS will also play a vital role. At the same time skills can be built up and more complicated RS analysis methods be implemented.

Near Shore Fishery

Near shore fishery is exploited in every Pacific Island Country. This type of fishery provides income for rural communities and is an essential part of Pacific life. Some countries support near shore fishery by establishing FADs, which are floats anchored in front of the coast to attract fish. Such FADs should be always in clear water during incoming and outgoing tide and not to be touched by the sediments of river mouths. Multi-temporal RS data would be of important assistance.

In some countries such as Fiji the landowning units extend to the reef flat and any monitoring of sustainable management requires mapping of the landowning boundaries. Mapping of marine parts, which are necessary in some areas to protect fish spawning, have similar GIS requirements.

Surveys record the available fishing equipment including storage facilities and the catch per village. GIS provides a synoptic overview.

Pearl Farming

Pearl farming is carried out to large extent in Cook Islands and is also now in Fiji, Marshall Islands and Kiribati. It is expected that this industry will grow further. GIS enables the monitoring and management of farms.

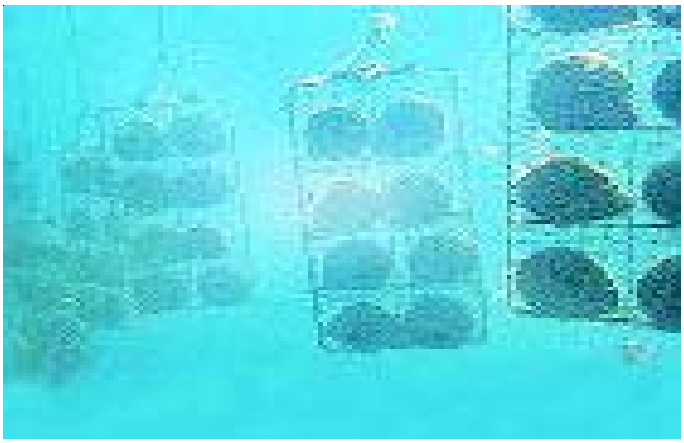


Figure 4: *Pearl shells in hanging baskets, the way pearl farming is currently carried out in Abaiang, Kiribati. Later, the single shells will be hanging down on lines.*

This is described in Newsletter 2002-01, where GIS observes the amount of shells within a lagoon to avoid diseases. Maps showing farm boundaries, bathymetry and image information can be produced to assist farmers in the management of their respective farms.

Figure 5: *Clam farming can provide additional income to local communities. Photo from the Internet, in Pacific Island Countries clam farming is carried out in shallow water where no diving equipment is required.*

Clam Farming

Clam farming becomes increasing important as an additional income for island communities. GIS information such as current and bathymetry assists in identifying areas where clams can be located to minismise spawn drifting out to deep water.

Milk Fish Farming

Milkfish can be an income on the local market, currently most of the production is sold as bait for long liners. In

Kiribati the fisheries department is managing its production and will establish a monitoring system.

Figure 6: *Seaweed farming is an importnat source for the chemical industry and provides income for local communities. Picture above shows the planiting stage in shallow water and the lower picture shows the product ready for pressing and subsequent shipping. Pictures provided by the Seaweed Project*

Sea Weed Farming

Seaweed farming is supported by the European Union in Kiribati and could become an important income for rural communities. The product has to be dried before it can be transported to Tarawa where it is pressed and shipped to the Philippines for processing. GIS will incorporate, bathymetry and current information to identify suitable farm areas. Mapping of land owning units on the island is required to avoid conflicts during the onshore drying process.

Coral and Aquarium Fish Trade

In Fiji and Christmas Islands aquarium fish trade developed into a sustainable industry. The customers in North America and Europe require the product certified as coming from a sustainably managed area. The same applies to coral trade where small parts of coral are transported alive to the same regions. A certification requires a harvest monitoring system, which must be based on detailed maps, inventories and recording of harvest. The maps will be produced from satellite imagery and bathymetric data. The recording of harvest must take the amount and the location into account and will be based on GIS.

Sea Cucumber Farming

In several countries sea cucumber is a lucrative business and in some cases the fisheries department assists this type of farming. GIS will help to monitor both the input of spawn and the harvest.

Summary

With the exception of Cook Islands no fisheries department of Pacific Island Countries have trained GIS personal. At the same time tuna extraction out of the Pacific drives towards the extinction of the resource as utilising high-tech equipment is not affordable by Pacific Island Countries.

There are other applications for management of marine resources aside from offshore ocean monitoring. GIS and remote sensing can be used for the initial management of nearshore resources. Once developed and users trained, more complicated remote sensing analyses such as ocean colour and temperature can then be applied. Once GIS is in place and sustainable, it will be possible to upgrade the skills of the operators to also monitor the offshore oceans. An indicator of a sustainable activity is the regular production of output.

Application of Multi-Spectral IKONOS Image Data at Fiji Pine

Wolf Forstreuter, SOPAC
Isireli Buwawa, Fiji Pine Limited

Introduction

The SOPAC EU project will purchase high-resolution satellite image data for each of the 8 countries involved. Areas where the Project would focus its efforts was selected by Stakeholders. The imagery will cover these specific areas. For Fiji the area selected for the Project are a) along the coral coast in southern Viti Levu between Pacific Harbour and Sigatoka b) the Navua water catchment and c) the Sigatoka water catchment. Fiji Pine Limited (FPL) is one of the many stakeholders with a few Stands existing on the periphery and within the Sigatoka catchment area. They are also the first stakeholder to utilise the image data.

Multi-spectral IKONOS image data from different space borne image data sources was selected because:

- The spatial resolution of 4m is sufficient for

thematic mapping at 1:10,000 scale, which is the mapping scale of most small Pacific Island states and the operational scale for utilities and organisations such as Fiji Pine.

- The four image bands allow analysis of water body where the blue channel is required and at the same time vegetation analysis where the near infra-red channel is of importance.

The first image interpretation at FPL showed that image data are extremely useful and the near-infrared band provides information which cannot be obtained from panchromatic aerial photographs.

Image Preparation

IKONOS image data is delivered as a geo-rectified product, however, from past experience in the Pacific most image data have to be re-rectified. The extents of the imagery are defined using global projections which when compared to local Pacific Island grids there is often a shift due to projection transformation. In addition, the image data has then to be converted from 16-bit to 8-bit data format for software products such as Adobe Photoshop and MapInfo to display the images correctly. The re-rectification and conversion to 8 bit MapInfo image backdrop in natural colour was performed as a training course at SOPAC.

Image display at FPL revealed that the re-rectified imagery was not sufficient for the scale they were working at and a more precise geometric correction was carried out using ground control points mapped in the area.

This does not mean that the image rectification at SOPAC has to be improved to the standard acceptable by all stakeholders. A stakeholder such as Fiji Pine, who uses only a small subset of the complete data coverage, will always have more precise reference data for this particular area and over time more reference data will be mapped using DGPS survey. The lesson learned is users must be able to do their own image rectification. Therefore the original data set has to be supplied rather than handing out the GIS backdrop as three layer GeoTIFF only. There are three more arguments, why the original image data set has to be handed out 1) a user such as FPL should be able to to select the bands required 2) carry out their own image enhancement and 3) an imprecise image correction and mosaicing can change the radiometric image content.

New Image Interpretation

After a more precise image correction two images were produced a) a natural colour image with the channel combination red, green, blue and b) a false colour image with the channel combination near infrared, red, green. For both images a simple contrast stretch was performed optimising forest – non-forest differences as well as best contrast between pine stands, gallery forest and bush vegetation. Then the image was converted from 16 bit to 8 bit by using ERDAS viewer to IMG routine and exported to GeoTIFF. The image interpretation showed that:

- False colour infrared image clearly distinguishes between bush vegetation, gallery forest and pine forest, see Figure 1. It is essential for vegetation mapping to have the false colour image combination.
- Satellite image data contain more spectral information than the aerial photographs which

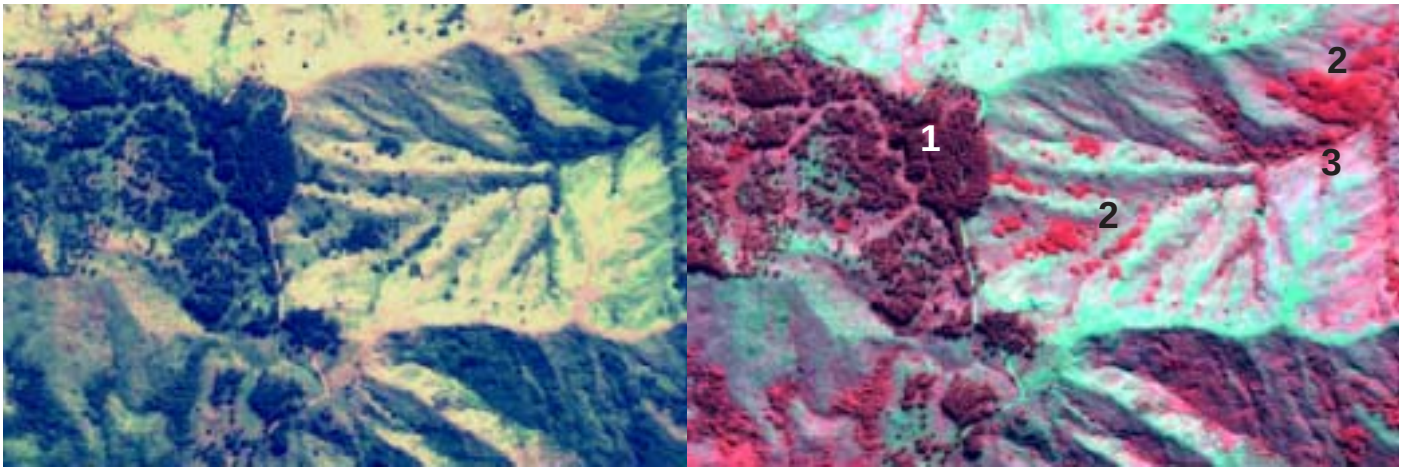


Figure 1: *The left picture shows a natural colour image combination using the red, green and blue IKONOS channel. The right picture shows a false colour infrared image combination using the near infrared, red and green channel of the IKONOS image. Pine plantations are shown in dark red (1), gallery forest are shown in intensive red (2) and bush vegetation in light red (3). The spectral content of the natural colour image does not allow this separation of vegetation. Field visits will increase the number of classes which can be separated.*

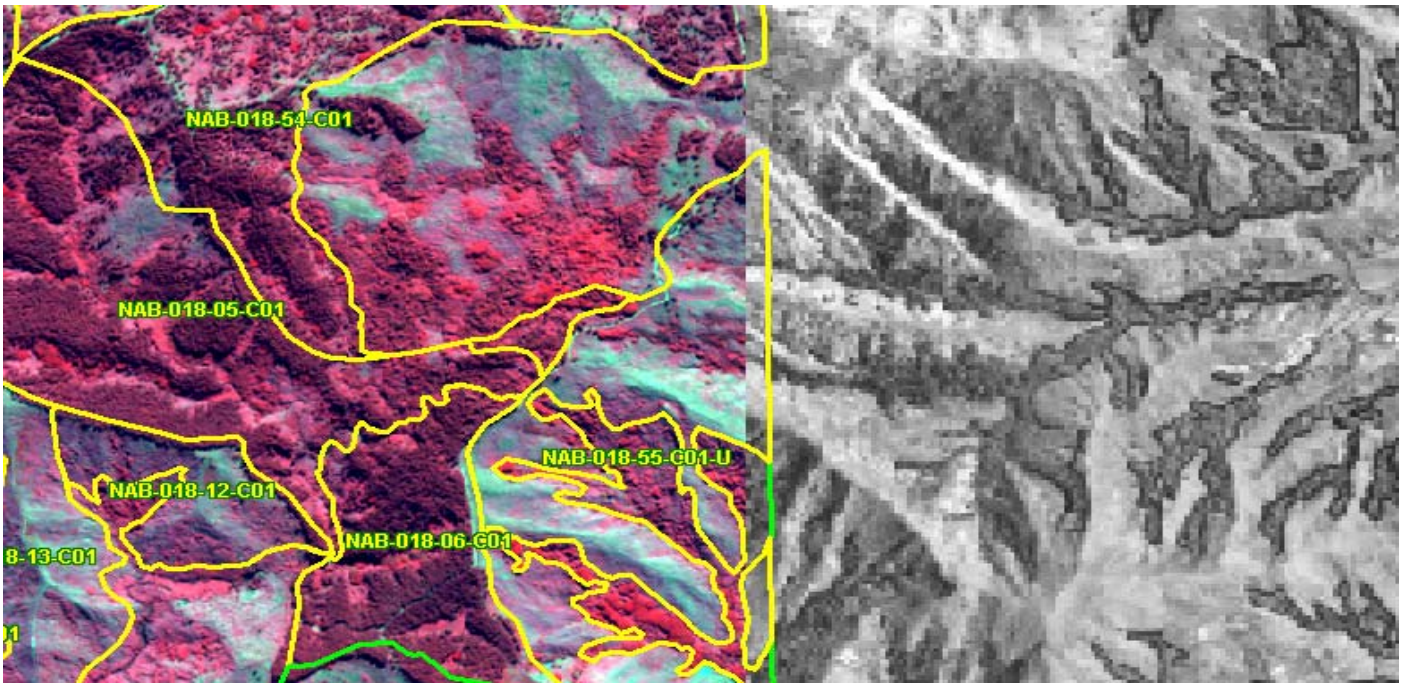


Figure 2: *IKONOS image and scanned aerial photograph as MapInfo GIS backdrop. The advantage of the near infrared providing additional spectral information is clearly visible.*

do not cover the infrared spectrum. This will be an important argument when FPL management will discuss the issue of purchasing wither new aerial photographs high-resolution or image data.

- Image data are up-to-date and the un-stocked and un-plantable areas can be mapped easily. The aerial photographs were recorded more than 5 years ago and do not show the current situation.
- Digitising from satellite image data is faster as the number of cases the operator has to decide non vegetation and vegetation are less. One planning unit could be done within half a day.
- Stocking of mature plantation areas is clearly visible.

Summary and Outlook

Multi-spectral IKONOS satellite images proved to be very useful as the infrared spectrum provides additional information to separate vegetation types required for monitoring the plantations and the interpretation is faster when using satellite image data instead of aerial photographs.

The investigation of satellite image data utilisation is ongoing. Also planned are field visits to set up interpretation keys of different stocking densities growing over different forest undergrowth. The interpretation keys should identify growth over certain time periods . using this key, areas where the survival rate of newly planted trees is too low can also be identified.

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Is GIS important? The case of Vanuatu GIS Core Group

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"Don't get wet in the rain when there is an umbrella lying close to you. Use it because it was made and provided for that purpose only. If you don't use it, you will be soaked."

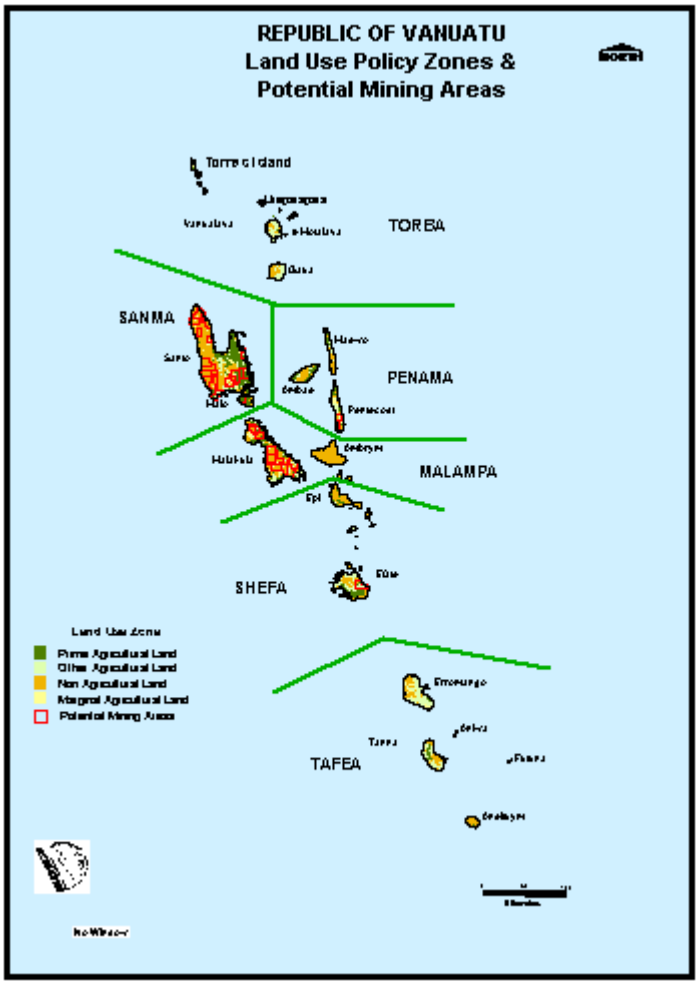
(Old northern Pentecost Proverb as retold by Late Fr.Walter Hadye LINI)

In the very early stages of GIS and RS development in Vanuatu, new GIS projects were funded by Donors, with each project using a different GIS package. These Projects were not continued, contributed largely to a lack of knowledge transfer to users. An additional problem with projects has been a lack of long-term plans as they were driven by a specific interest by outsiders/consultants. Duplication of effort by different government and regional organisations has added to the problems. The use of new technologies has also seen a wide range of equipment purchased with little knowledge base on troubleshooting developed. The Vanuatu GIS&RS Core group wants to develop a work plan that will tie together GIS&RS activities across all government departments, NGOs and statutory bodies.

"Make use of the technology when it is with you because when it is gone, you will regret it"

"Is GIS important in Vanuatu: The case of the GIS Core group" was the topic of the paper I prepared to present at the GIS&RS Forum, to shed some light to the "politics" of GIS in Vanuatu, to put it in a different tone. I intended to share the story about our users with you because there are few things I see that needs to be addressed now so that other country's may not face similar problems and experiences, but develop something more constructive as they develop their GIS/RS.

If the proverb is right, why are we not using the umbrella when it is lying right next to you? Use it!



What is VANRIS?

To begin with, our initial GIS package is VANRIS (Vanuatu Resources Information system) built in Access database with MapInfo tab files attached as the mappable part of the database. During the set-up of this project, three sets of Agreements were signed. One was for an organisation or an individual to be part of the project, two, a data sharing agreement and three a short-term agreement for consultants who may wish to use VANRIS in the country. Having done this under Cap 83 of the Statistic Act, it paved ways for a common data collection and sharing policy by all government departments. The Data Agreement was seen to be the best and solution for future GIS and RS work in the country.

The VANRIS database has almost everything on Vanuatu, from population density, land use zones, farming systems, cadastral maps, contours, attitudes, schools, roads, ocean depths etc. It is the biggest data bank the country houses now and it will be the only one where other GIS packages can be linked to in the future.

VANRIS/GIS Core group

In reality, the VANRIS core group is now a shadow group and not functioning anymore but has been elevated to the GIS core group. The GIS Core group was born from the VANRIS core group made up of advanced VANRIS Core users set up in 1995-2000 during the Land Use Planning Project (LUPO). Other users are those throughout the country who are using the tool for first hand planning needs.

The GIS core group has prioritised several key areas to be the optimum goals for GIS and RS development in Vanuatu. From many of these priorities, here are some objectives that the group wishes to achieve. These are:

- new policies regarding GIS projects in the country
- Data sharing policies (a more coherent one which will be debated and mandated under certain acts of parliament).
- How data is shared among national and international users/organisations
- Advice and Directions on new GIS/RS projects.
- A policy paper to be submitted to parliament as of next year for government's recognition of the group.

During 1995-2000, the VANRIS group gained respect among many government departments, individuals and regional organisations. Planners, economists, Directors and Director Generals and political advisers were introduced and trained on how to use the mapping database for project documentations. Locally and internationally, LUPO became the office to advise on development issues like can a lease can be granted for a particular reason or not. The office helped in alleviating poor decisions on land speculation and helped at least for policy makers to know where and what types of soils, land use policy is, what population type is in the project site etc. Out from this project, we developed six provincial atlases and a national land use policy.

However, today funds have been minimised collapsing our trainings in the provinces and also among the stakeholders. The chairmanship of the group was replaced and given to Lands survey and later now to Geology and Mines. Having to deal with GIS and RS

and allowing this to happen saw a great dive in the use of GIS and RS.

VANRIS by local GIS experts so to speak is spoken of as dead. To put this in its own perspective, the group has ended its life and services, meetings, data updates, trainings, trouble shooting, computer related knowledge, a rather sad thing to see to have happened among our own users and again another of those projects that did not work for us. Though it maybe seen by many as dead, we still continue to serve those clients who needs it but at a very low scale.

Most government departments are working in isolation of each other. There are GIS projects that no one knows of. People travel overseas to attend GIS and RS meetings without the consent of those who are able GIS and RS users. This won't stop me to say that my unit still exists and doing serious mapping. The weaknesses I am sharing have given many of us an urge to seriously accept GIS/RS development. Under the EDF-8 project we wish to achieve new outputs and that some of the problems we have gone through now will be solved. We have begun this with two trainings so far, the Utilities and Image Rectification, which has been successfully completed by our users. Another training will be conducted sometimes in February after the Vanuatu Map server is installed.

In terms of bad GIS projects I can direct you to Environment Australia Fauna and Flora project built in on the ArcGIS. The project was done under the Forestry conservation unit and the Environment Unit. This project has not been completed and we don't know where it is now.

A lack of education on data uses and sharing among us has prompted exposure to many data types. One of the main reasons is that GIS knowledge is limited. With just a little hands-on training, I can buy the argument that we have progressed but hesitate to acknowledge the fact that our capability in using the tool is minimal. We have not been fully exposed and utilised the tool, the simple tricks in solving problems to the full understanding of it in theory and practical. While many users have been trained at an institution like USP and short trainings through SOPAC, SPC etc, with minimal knowledge of GIS, we still lack the main things that have to be addressed among us. To speak for all users in Vanuatu, I can say that GIS knowledge is just taking its place among our users but pose to say that we have made progress but at a very reasonable level of achievements.

The problems I see are; that our users are not keen to keep up with today's GIS works and, a lack of what is to be done when using the tool. There are projects that we can do to help minimise some of the dangers we have caused to our lands. Land use planning, utilities planning, road networks etc are interesting areas of more GIS but we can not do it as people can not plan and have not made themselves acquainted to technological changes and that is GIS and RS. Although some of these projects have been developed to meet proper planning and management of resources, we continue to face operative knowledge; something, which I can say, has been the downfall of GIS in Vanuatu. GIS users in Vanuatu are not trained to be GIS users. Maybe there are users but not technicians and this has not helped in developing GIS at a standard I see as a "thorough knowledge of what GIS and remote sensing is".

Most GIS users in Vanuatu lack technological capability and that this is something I wish to bring to all Users in this forum that we need an open forum for discussion on GIS and RS. I know that SOPAC has created a GIS-Pacnet list server for GIS and RS development throughput the region but we have not utilised it because of Internet access and costs that maybe incurred by a certain department if ever it has Internet connection. Few have gov.vu connection to the

Figure 2: *4m Multispectral IKONOS imagery over Efate has been captured for theSOPAC EU Project.*

government server or direct links to TVL Vanuatu under the com.vu addresses yet many have nothing.

The basic issue of planning which we have developed throughout 1995-2000 was VANRIS. USP, SOPAC and other regional bodies have access to VANRIS. This set of database is the heart of Vanuatu. I wish to ask those involved with this dataset that we are giving our lives into your hands and that security and care should be cautious in using the data. VANRIS (Vanuatu Resources Information system) was developed to allow us to see and make very constructive decisions at a very low scale. With the ISM in place, Vanuatu is ready and willing to move forward should there be avenues to allow us go forward for very comprehensive GIS and Remote sensing works.

Conclusions

Building communities with GIS, a theme which the Fiji GIS and RS Interested Group Annual Conference has chosen for the 2003 Conference can be argued by my country's group as fundamental and necessary as we broaden our peoples through media, training of high school teachers and conferences. Let me say that VANRIS has a total of over 60 users in the country. With over 60 users in Vanuatu with very limited knowledge of computing, one can always argue that it is a big leap. Thank you for listening. As you have been made aware of our situation, my well wishers in Vanuatu would like to ask that the next GIS/RS meeting be held in Vanuatu. I am happy to carry out this statement because I know how have missed so much in the Vanuatu and I want some of you to come and present your work to us.

Thank you blong lisen I kam long mi.

Sixth Annual User Conference

Coway Pene
University of the South Pacific

The Sixth Annual Pacific GIS and RS User conference was held from November 25-27 at the University of the South Pacific (USP) Marine Studies complex. This annual event is a highlight on the calendar for the GIS and RS user community in Fiji, and is increasingly attracting a wider audience from the Pacific region. The idea for the conference was first put forward in 1998, by the Director of GIS at USP at the time, James Briton. The first conference, in December 1998, was attended by a total of 70 participants. Since then, attendance has grown every year and in 2003, 180 people attended over the 3 days of the conference.

The theme for the 2003 conference was 'Building Pacific Islands GIS and RS Communities'. The theme was chosen in recognition of the increasing efforts to develop GIS and RS in many of the smaller Pacific Islands countries through collaborative efforts with more experienced users. The theme also reflected the increasingly collaborative nature of many GIS and RS applications in fields that had not used GIS and RS tools technology before.

The conference was opened by Dr Russell Howorth, the Deputy Director of SOPAC, after a welcome from Prof. Randolph Thaman of the Geography Department of USP, and Prof. Rajesh Chandra, acting Vice Chancellor of USP. Dr Howorth stressed the importance of ocean resources to Pacific Islands countries, and outlined SOPAC's approach to the development of these resources using GIS and RS technology.

The conference had three main areas of focus. Firstly, the presentation of updates from many of the organisations attending allowed attendees to have a quick overview of the state of GIS and RS in Fiji and the wider region. The updates allowed organisations to spread information about their progress during the year and any special success and challenges they wished to share with the wider user community. Secondly, organisations and individuals presented special projects that had been developed over the year. This saw a number of presentations of pilot projects from a variety of organisations and included projects from USP students. These pilot projects provide a good indicator for future directions of GIS, and allowed for discussion of the issues and challenges facing their wider implementation. Thirdly, the conference provided a unique environment for the GIS and RS community to meet and share ideas make contacts in the informal setting of the conference social events. A cocktail on the opening night, dinner on the closing night, and a day cruise on the day after the conference, gave participants to relax and meet in an informal social atmosphere.

The conference was funded by sponsorship from a variety of organisations and companies, whose generous contributions make the event possible. In order to make participation available to as wide an audience as possible, the conference does not charge any fees. The organisers would like to thank the Fiji Land Information Council; French Embassy (Suva); Telecom Fiji; Native Lands Trust Board; SOPAC; USP; GeoSystems NZ; Lukemine Enterprises; Bently Systems and Intergraph NZ. A full report on the conference is currently being compiled, and will be available in January 2004.

For a copy of the report, please contact Conway Pene at the Geography Department at USP. **pene_c@usp.ac.fj**

Use of GIS in the Power Utility (SIEA) for Analysis of Customer Billing System in Solomon Islands

Robinson Wood, Martin Rasu,
Mahli Sanau
SIEA GIS Section

Introduction:

This paper describes the use of GIS as a tool for the analysis of the billing system within the Solomon Islands Electricity Authority (SIEA). The paper begins with a brief summary of the development and progress of GIS within SIEA as tool for asset management in a power utility. The subject matter is divided into three (3) sub-topics to show the relevance of GIS and its use for asset management. These are as follows:

- GIS Development in Solomon Islands
- Accessing Information from GIS
- Use of GIS for Analysis of Revenue Loss within SIEA.

GIS was first introduced to SIEA in 1996 when under the then European Union (EU) sponsored Forum Power Utility Training programme two of the Authority's engineers were invited to participate in the first GIS Workshop for Power Utilities held in Nukualofa, Tonga hosted by the Tongan Electricity Power Board (TEPB). As a follow up from this workshop, another GIS workshops was held in Lautoka, Fiji in April 1998. Following this workshop and the signing of the agreement with the Trimble representative in Fiji, and a subsequent request to SOPAC, staff from the former visited SIEA in August to1998 to set up the Base Station for GPS surveys. In October 1998 another GIS Workshop was conducted at the SOPAC facilities in Suva, Fiji mainly to add photographic image backdrop layer to the cadastral map of Honiara. In this case only Honiara has been targeted, as it was the only SIEA operational centre with aerial photos. Since then the Authority had got two staff working full time on the project, doing GPS surveys and collecting data for the SIEA GIS.

GIS Development in SIEA

GIS was first introduced to SIEA in 1996 and 1998 through Workshops sponsored by UNDP under the auspices of the Forum Secretariat's Power Utilities Training Programme which effectively came to a halt at the end of 1998.

The training programs for the GIS include training on the following:

- Database Building – Microsoft Access
- Programme Writing – MapBasic
- Creating Map Layers – MapInfo

After having undergone the training the GIS staff were able to create tabular databases for the distribution system and customers, and link these tables in Microsoft Access. They were also able to get the cadastral map and photographic images of Honiara established in MapInfo and were able to write programs in MapBasic to create thematic maps showing the locations of the distribution assets and also SIEA customers in Honiara.

From 1998 till 2003 the GIS programme had progressed although slowly with all work been concentrated on Honiara. Despite the ethnic tension, which came about in the early stage of the system development in 1999 the GPS surveys still continued during this difficult time and it is still progressing.

Thus far the following areas have been covered, some in greater detail others still to be completed.

- Data collection
- GPS Survey data
- Data Inputs
- Program writing

As far as data collection is concerned, about 98% of the data for distribution lines including transformers, poles, switches, fuses etc., and customers have already been completed. The remaining 2% outstanding work is mainly to do with verifying and checking the integrity of the data collected.

In the area of GPS Surveys, 95% of he distribution system in Honiara has been completed. This includes GPS surveys of power poles, substations, switches, fuses and distribution lines such as cables, and conductors. In addition GPS surveys of 65% of the customers in Honiara had also been done.

Most of the data collected including the GPS surveys had been inputted into the GIS programme with progammes written in MapBasic to create thematic maps of the various assets such as poles, fuses substations and customers and to show the location of these on a map of Honiara in MapInfo.

GIS is still in its developmental stage in SIEA and although there had been success in mapping out the distribution system assets for Honiara there is still a lot of work to be done to cover other eight operational centres of SIEA out in the provinces. Although there has been interest for the GIS program shown from the management level that has really boosted our enthusiasm for improving use of the GIS program itself lack of resources, mainly transport, had restricted progress.

Following the recently held workshop at the SIEA Training Center in October 2003 funded under EU and

conducted by Dr. Wolf Forstreuter and Elizabeth Lomani (both technical staff of SOPAC), the development of the SIEA GIS program can only improve to a much higher level but much depends on the support and recognition given to this development programme in terms of resources and the benefits that can be derived in the area of asset management. Having participated in this workshop, the GIS Section of SIEA can only improve on developments to date and in the long run build a GIS that will enhance the asset management capabilities of the Authority as far as the distribution system and customers are concerned.

With the use of GIS we have access at the click of a button to information, which would otherwise take longer to access under current SIEA operating conditions. In addition we can save time and reduce expenses as distribution system faults, customer complaints and enquiries can be pinpointed more accurately and fault crews dispatched to the locations without having to search around, as its current practice without GIS. This is because you have information needed right in front of you available on the PC and copies can be printed out for those requiring hard copies of the information.

Another benefit of GIS is that it provides information on both spatial and non-spatial data. The GIS set up would also assist departments concerned, mainly engineers who often need up to date information related to the distribution system.

Accessing Information from GIS

This section deals with how we can access any information using the GIS system. Although the SIEA power utility GIS is yet to be completed with regards to GPS surveys, and data collection and collation, work done so far could already be used to analyze some of the distribution system assets and customers in the areas covered. It will take time and resources to fully complete the GIS system for all of SIEA's Operating Centres.

Despite using the latest software version of the programs required for GIS, there is need for ongoing training in the field of program writing or database building, such as the one recently conducted by SOPAC as SIEA do not have the expertise in this area.

Currently information on distribution poles, substations, transformers, fuses, overhead conductors, underground cables and customers can be accessed from either the database in MS Access or from within MapInfo. To access information from MS Access we can go to the SIEA Main Tabular Database and click on the relevant section.

Because GIS is still in its developmental stage in SIEA, its success and impact on the area of asset management cannot be fully realized at this stage. However, benefits of the system are already evident from the information that can already be provided at this stage.

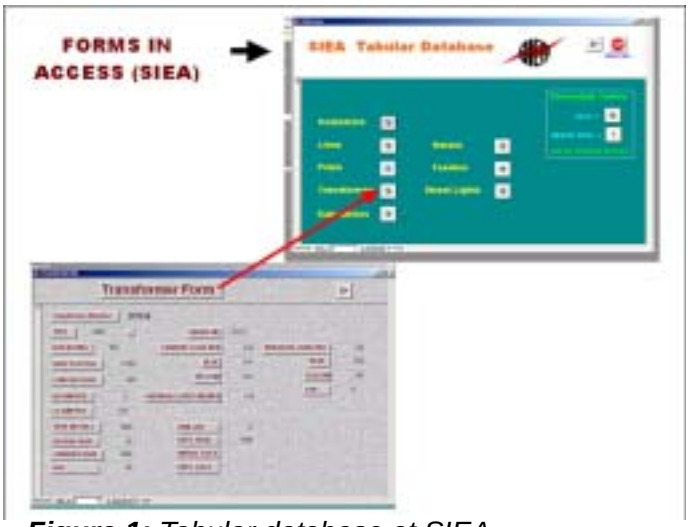


Figure 1: *Tabular database at SIEA*

One area that would need attention and focus in the latter stages of the development of GIS, is the training of SIEA staff from Departments who will be using GIS how to use the programme to better manage the respective assets and how to access information stored on GIS. This would also assist in making sure staff have access to information to provide a better service to the valued customers and the public at large.

Use of GIS for Analysis of Revenue Loss within SIEA

This third and last section of the report is an example of how information stored on the SIEA GIS is used to analyze revenue losses within SIEA.

One of the aims of the SIEA GIS was to assist in providing information for identifying customers who are connected to the SIEA distribution system network, such as quarterly energy usage averages, usage patterns and also customers with zero readings who could be disconnected or who are still connected but with meters not been read. Early in 2003 it was identified while running a query on customers with zero readings that there was a substantial number of customers with a zero reading. This prompted the Authority to carry out a Customer Audit early in 2003, a task, which was never completed

Another query on the customers with a zero reading was done recently in November 2003, which shows that there are still a substantial number of customers (4,000 +) with zero readings. Some of these customers are relocated in areas outside of the Honiara Town Boundaries such as Foxwood, CDC and Kakambona areas mostly affected by the ethnic

tension. However, a large portion of the customers with zero readings are also within the Honiara Town areas.

This is a matter of concern and need follow up as the Authority could be loosing revenue if some of these meters had been displaying zero readings for over several billing cycles.

GIS will assist in providing thematic maps to show locations of the customers with zero readings so that Customers Services Section of the Authority can check these out and verify the status of the readings.

One of the other areas, which was identified during running of the GIS queries, was the number of customers with no names against installation numbers. It was only after these were pointed out together with the customers with zero readings that the authority then set up a task force, which is responsible to carry out an audit survey to find customers who don't have right names but using consumer instead in the system (see figure 2). As such the authority cannot send or post any bills to these customers and again the Authority was not collecting its dues from such customers and hence loosing revenue

In these cases the authority is losing revenue on the billing system. Fortunately, the customer update information was made to the billing system in mid 2003, which should assist in rectifying customer records.

One of the major objectives of SIEA is to provide efficient service for customer while receiving better revenue in return through its billing system. This should be further enhanced with the use of GIS program, which we hope will create a much better service to everyone.

Conclusion

In conclusion it can be seen that GIS is a great tool for asset management if utilized properly. It could provide substantial benefits for the Authority both in terms of reduced maintenance costs and reducing revenue losses.

As one who had been working on the SIEA GIS, I feel confident to say that GIS is a significant tool, which enhance better servicing both within the Authority and to its valued customers. Despite setbacks and constraints encounted, we have made it through and feel rewarded when we saw some of the success achieved. It is of concern that the customer audit task was halted as this would greatly assist in finding out about what customer problems may be out there. Lastly, I think the success of these programs depend on the cooperation of all SIEA departments who would be users of GIS once fully developed.

The Heads of Departments and/or immediate supervisors in the distribution and customer services groups should visit the GIS Section and discuss with the GIS staff about their requirement so that they can take the necessary action to organize their respective work groups to get most benefit out of the GIS. This will help to provide good workmanship and an environment in which we will all enjoy and also proud of.

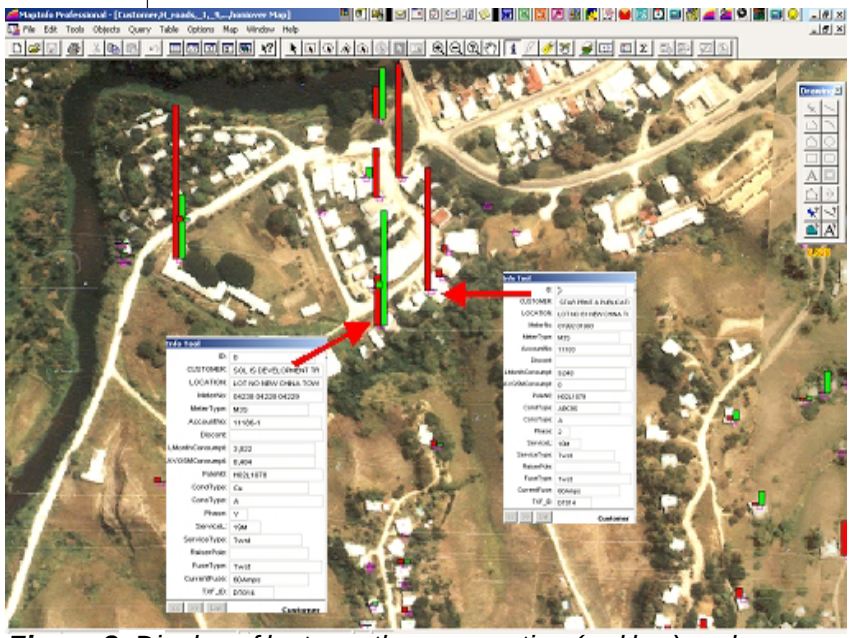


Figure 3: *Display of last month consumption (red bar) and average of last five months consumtion (green bar)*

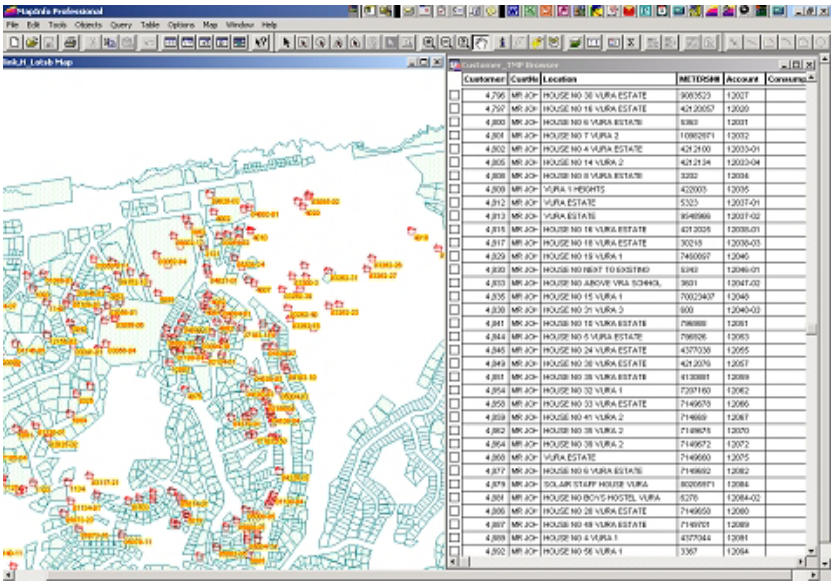


Figure 2: *Customer location, name and installation number.*

Cost Savings through the Use of GIS at Fiji Pine ltd.

Satya Nand
Fiji Pine ltd.

The Fiji Pine's GIS has made significant progress only since early 2003 and are already reaping benefits in terms of cartage costs. Our cartage rates are dependent on distance between the Tropik mill in Drasa to the areas of operation.

During the months of January and February, Fiji Pine (FPL) recorded a loss of $34,000 in cartage costs. As from March FPL started calculating road distances from data captured in GIS, and this provided more accurate distances within minutes whereby reducing the cartage rates. As at the end of 2003 FPL recorded a savings of $292,700, resulting in a net savings of $258,700. This was possible with GIS that has provided more accurate distances. Having realized the savings, distance determination by GIS was used extensively by Area managers in the preparation of our 2004 budget for:

1. Road Maintenance
2. Construction of New Roads
3. Cartage Costs
4. Preparation of Fire Breaks

At the moment FPL has started to use GIS in the preparation of logging plans. It must be noted that these plans were produced previously using the conventional methods, which was never archived. FPL now intend to store these plans in CD'S so that in the next 15yrs when we are ready to harvest the 3rd rotation the logging plans will be available at a press of a button.

Figure 1: *GIS display of transport routes from the logging areas to Drasa mil*

Image Enhancement of Multi-Spectral IKONOS Image Data for Forest Stratification

Wolf Forstreuter (SOPAC)
Akosita Lewai (Fiji Forestry Department)

Introduction

The Navua Catchment was selected as a test site to apply high-resolution image data (IKONOS) for different use. Fiji's forestry department is one of the stakeholders of the SOPAC-EU project and will test the potential of this image data for forest inventory. An important part of any forest inventory is the mapping of forest cover, where the exact forest area has to be determined. IKONOS image data are the first type of space borne remote sensing information allowing forest mapping at a scale of 1:10,000. During the mapping process not only the boundary between forest and non-forest area has to be identified it is also important to identify and map as many different forest types as possible. The forest canopy has to be stratified into sub-areas of higher homogeneity. When the forest mapping is completed the number of sample plots can be calculated where inventory teams measure the standing timber volume. Furthermore the canopy is stratified into more homogeneous sub-areas as less sample plots are required for the same statistical accuracy. Therefore, the potential of forest stratification is directly linked to the cost of the inventory.

Fiji is planning to undertake the National Forest Inventory and the Management Services Division (MSD) of the Forestry Department is testing potential multi-spectral IKONOS data to visually differentiate the various forest types in the image. The degree of stratification will depend on the ability to visually interpret spectral differences within the forest canopy.

Image Preparation and Fieldwork

The in-office data preparation concentrated on a) band selection, b) different image contrast stretches and c) arithmetic image enhancements such as ratios and principal component transformation. Then, a field team went on a two day field trip into the area using a Garmin 12XL GPS to determine the exact location on the ground which were marked on the satellite image. Therefore prints of the image were taken into the field.

The area selected for the verification is located along the logging road of Tubarua to the riverbank opposite to Namuamua village in Serua, see Figure 1.

Observations:

Site 1: This site had the highest concentration of dark red spots; the site is of high-density mahogany

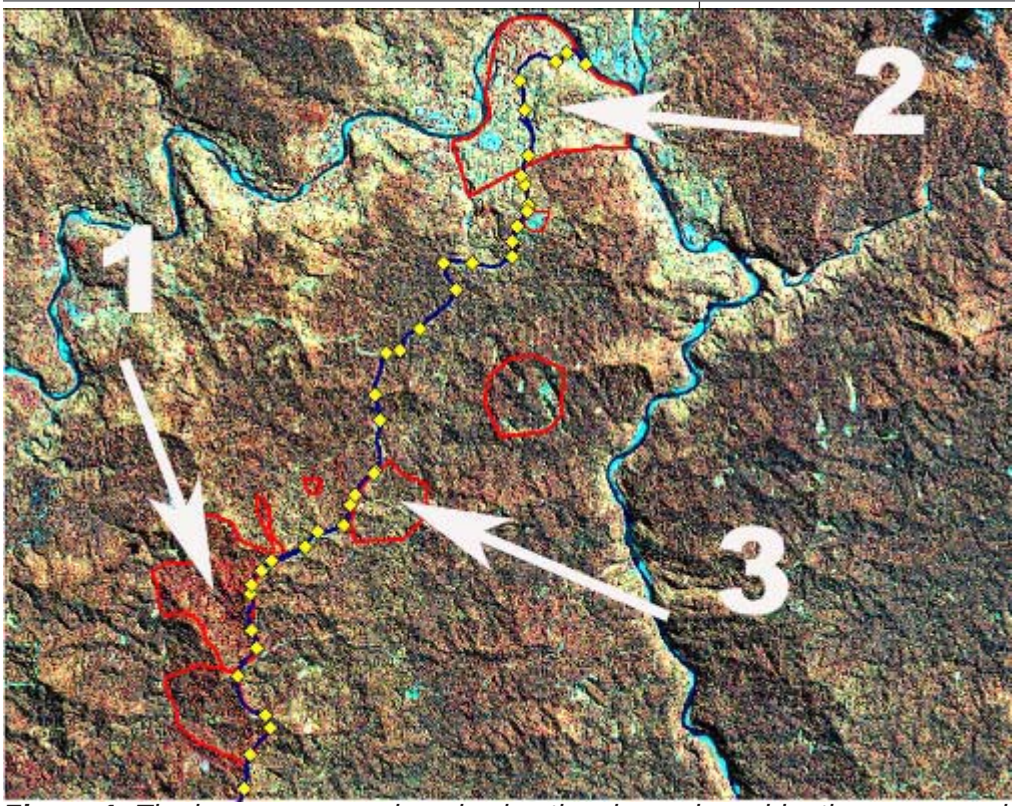


Figure 1: *The image was produced using the channel combination green, red and near-infrared. The test sites are outlined in red and the GPS waypoints are displayed as yellow routes.*

plantation (Galoa Plantation).

Site 2: This site is of the bank of the Navua River and some neighbouring settlements; vegetation is mainly scattered multiple use forest (ferns, bamboo, grass and shrubs).

Site 3: The site shown is mainly of scattered forest vegetation. The site is one of the old logging areas and there is some evidence of re-generation, and leftover stock is too young be logged.

First Recommendations

a) Image mosaicing has to be performed without adjusting the contrast between the images. IKONOS images are recorded at different days and with slightly different view angles. When adjusting the contrast between the images the contrast is reduced between different image features at the same time. It was not possible to see the difference between mahogany and natural forest.

b) The near-infrared band contains important information for forest stratification. Mahogany was clearly visible and could be separated from indigenous forest. It is essential to use either a band combination blue, green, near infrared or green, red, near infrared. The natural colour combination blue, green, red did not show the required contrast.

c) IKONOS images provide usable information for the stratification of forest cover in Fiji and will allow more stratification than would be possible with panchromatic or natural colour remote sensing data. Because it is extremely difficult to record infrared photography in a country like Fiji, IKONOS data containing the near-infrared portion provide a cost effective solution for forest stratification at 1:10,000 scale.

Further Image Enhancement

After the field work, different advanced image enhancement techniques were tested together with Fiji Hardwood Corporation and Fiji Pine Limited. The following only describes the techniques identified as useful.

Image Masking

The outline of a mahogany plantation was digitised in MapInfo and exported as Shape file to ERDAS, where the file was converted to a raster layer, which was used as an image mask. Using this mask it was possible to display only the pixels of the plantation area. The image stretch was not influenced by non-plantation areas and showed more contrast allowing a better stratification of forest vegetation.

Image Rationing

Through dividing pixels of the near-infrared image band by corresponding pixels of the red image band the influence of slope shadow was reduced and the contrast between Mahogany, natural forest and un-stocked areas was enhanced at the same time. The result of the image ratio is a new image channel.

Visualising the Ratio Image

The normal RGB (Red, Green, Blue) image format was transformed into IHS (Intensity, Hue, Saturation) image format. Hue was then replaced by the ratio image and the IHS was transferred back into RGB. The result allows a fast mapping of areas where mahogany dominates the forest canopy.

Summary and Recommendations

a) A suitable image enhancement cannot be performed without test areas selected in the field.

b) Image enhancement for forest vegetation in Fiji requires more advanced image enhancement than band selection and linear contrast stretch.

c) Advanced image enhancement requires the knowledge of physical parameters of the image type

Figure 2: *The polygon of the plantation boundary was digitised in MapInfo converted to Shape file, imported to ERDAS and converted to a raster layer used to mask out all non-plantation areas.*

and basic knowledge in statistics.

d) SOPAC has to provide training to transfer this knowledge to technical staff working on vegetation mapping to ensure that the full image content of IKONOS images is utilised.

Fiji Hardwood Corporation, Fiji Pine and Fiji Forestry Department still use on-screen delineation and subsequent digitising to map the different forest types. As a next step SOPAC has to train techniques transfer a computer-assisted image analysis.

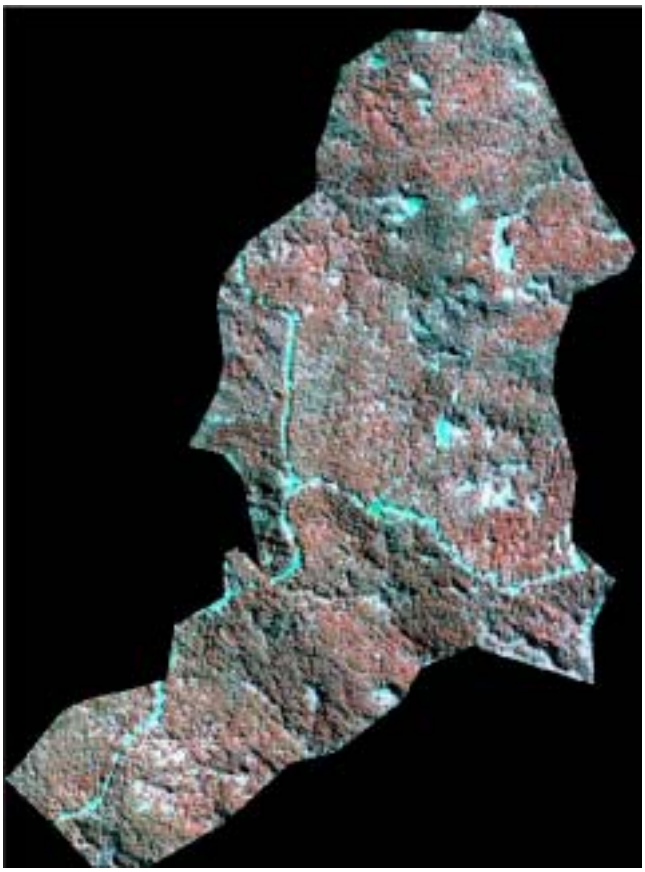


Figure 3: *After masking out all non-plantation areas, the ehancement concentrates on pixels which show forest cover only (part of Galoa plantation).*

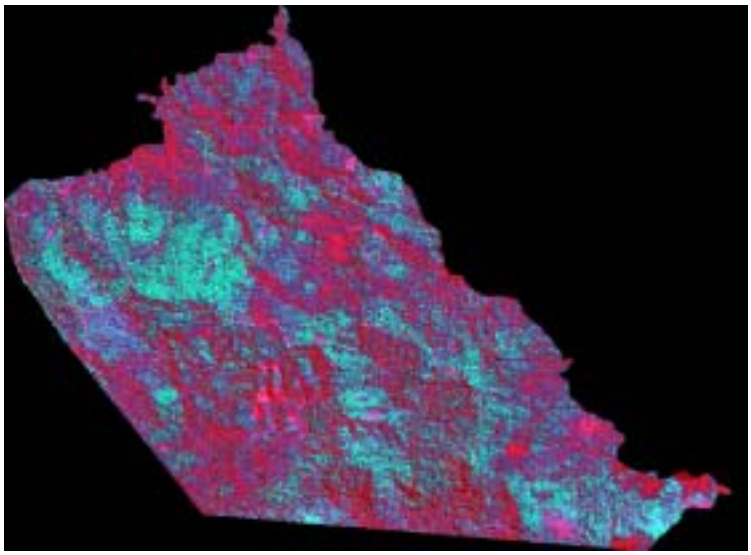


Figure 4: *This "synthetic" image was converted from RGB to IHS, then hue was replaced by a ratio infrared/red and converted back to RGB. All Mahogany dominated parts of the canopy are shown in blue other parts are shown in differing red tones (different part of Galoa plantation).*

EDF Project Updates

Litea Biukoto

The EDF9 Consolidation Agreement between Forum Secretariat and SOPAC became active from the end of March. Interviews for the EDF8 Oceanographer and the four EDF9 Advisor positions have been completed. Appointments once finalised shall be announced.

FIJI

An introductory GPS/GIS course was held March 15 - 19 for National Disaster Management Office, Security Division and the Fiji Red Cross.

Landslide Assessment Project for the Navua catchment is ongoing with Forestry and other stakeholders and includes training for stakeholders, May 17 - 21 The objective is to develop a methodology whereby stakeholders can identify actual landslides and potential threats based on easily accessible and existing data sources within a GIS&RS environment. Sandra Melzner, a Masters student at the University of Bonn will to assist in the development of a regional model that could be applied to the rest of the country

Reg Sanday, Resource Economist, has been assisting Partners in Community Development - Fiji in developing a model for community vulnerability analysis. PCDF is applying the model to villages in the Lau Group under an AusAID regional project implemented by the FSPI

Wolf Forstreuter, GIS&RS Specialist and Elizabeth Lomani, GIS/RS/ICT Project Intern have been assisting Fiji Electricity Authority in GIS databasing and customisation

SOPAC EU Project Updates

The first training on image enhancement for vegetation analysis included Fiji Pine Limited, Fiji Hardwood Corporation and Department of Forestry, April 27 – 27. Fiji Hardwood and Forestry are applying the techniques in stratifying vegetating cover to identify broadleaf within coniferous areas. Broadleaf vegetation provides stability to the soil in valleys thus would be delineated as non-logging areas

Fiji Hardwood is mapping mahogany plantations where mahogany trees have grown through the canopy and are visible on the satellite imagery. They now stratify mahogany areas into mahogany and leftover natural forest plus other species planted using the near infrared band which provides additional information. Though these techniques are possible with aerial photography, high resolution satellite data is a lot more cost effective. Fiji Hardwood has since planned to map remaining mahogany plantations using satellite data.

KIRIBATI

FranckMartin, ICT Specialist, set up the MapServer (http://map.gov.ki) at the Ministry of Fisheries and Marine Resource Development in Bairiki and followed it up with a workshop for stakeholders in uploading data and updating the site.

NIUE

Michael Bonte, Risk Analyst and Litea Biukoto, Project Assistant were in Niue 23 April - 04 May to assess the wave and wind impact of TC Heta on the built and physical environment and document eyewitness accounts of the event. The outcomes will be incorporated into the numerical modelling of the wave impacts on Alofi. A 3D fly-through developed from the model will provide a visual of the actual impacts of TC Heta and identify potential areas affected should another event of the same magnitude occur.

Alofi, Niue's business district pre (left) and post (right) TC Heta. The post Heta image is a pansharpened IKONOS image, 1m resolution

The post TC Heta IKONOS imagery was purchased and has been valuable for mapping out affected areas

PAPUA NEW GUINEA

Franck is in Port Moresby to consult with stakeholders issues related to the MapServer and identify a possible location for it

SAMOA

The data from the swathmapping survey is being analysed by Quan Chung, Technical Assistant

Reg represented the project at a 4-day meeting in Apia of the Pacific Group of ACP countries in discussion with the EU about procedures for implementing EDF9 projects

Reg is planning to undertake an in-country visit 24 - 31 May for consultations on Project issues.

SOLOMON ISLANDS

Reg met with Provincial Council Stakeholders in Honiara , Malaita and New Georgia and visited the GIS centre

TONGA

Whilst enroute to Samoa the MV Turagalevu detoured to Niuafo'ou aka Tin Can Island to map the bathymetry of the island. The island got its name from the unique mail system where incoming and outgoing mail were sealed in 40-pound biscuit tins and transported between the ship and island by swimmers

TUVALU

Faatasi Mautama, Director of Lands, uploaded some Tuvalu datasets whilst on attachment at SOPAC, to the Tuvalu MapServer. The remaining were uploaded by Meelina and Tesimita Ailesi, GIS students at the University of the South Pacific

The proposed starting date for the swathmapping survey of the Tuvalu atolls is mid- to late May

VANUATU

Wolf and Elizabeth conducted training in GIS customisation using MapInfo, MapBasic and Microsoft Access., March 22 - April 09

Department of Lands and Survey have expressed an interest in Database handling and GIS customisation

Franck worked with Williams Ganileo, Country Intern, in setting up the MapServer at the Ministry of Finance. The uploaded data include a portion of the VANRIS datasets. <http://map.vanuatu.gov.vu>

Stephen Booth, Project Leader & Water Resources Specialist consulted with Mines & Geology and Environment staff, particularly in relation to the Tagabe and Teouma catchments and a field visit to Bouffa landfill was undertaken. A reconnaissance visit was also undertaken to Malakula (Lakatoro) to review damage to rural water supply installations following TC Ivy.